Laser Receiver
Model MCR3

Operator's Manual

Thank you for purchasing a Futtura product. Your receiver is a premium quality tool that has been designed and manufactured to provide years of precise and reliable performance. The system has been specifically designed for use in harsh construction environments.

This manual is an important part of your purchase as it will familiarize you with the unit and explain the numerous features that have been designed into it. Please read this manual thoroughly before using your receiver.

Please contact your dealer should you have questions regarding specific applications or if you require additional information.

Please record your product information below. This will assist you if there are any questions regarding warranty or service.

PRODUCT: _____

SERIAL NUMBER: _____

PRODUCT: _____

SERIAL NUMBER: _____

DATE OF PURCHASE: _____

PURCHASED FROM: _____

PHONE: _____

Contents

Machine Control / Display Laser Receiver

Contents 1

Safety 2

System Description 3

Controls and Displays 4

Battery Installation / Charging 6

Operation - Primary Functions 8

Installation
- General 11
- Grading 12
- Excavating 13

Operation - Secondary Functions 19

Maintenance and Care 21

Specifications 22

Warranty 23

Safety

Meaning of Symbols:

WARNING: Indicates a potential hazardous situation, which could result in death or serious injury.

CAUTION: Indicates a potentially hazardous situation, which could result in a minor or moderate injury and/or material, financial, or environmental damage.

NOTE: Important information to enable the product to be used in a correct and efficient manner unrelated to safety.

The user of this product is expected to follow all operating and safety instructions of this manual and of the machinery operator's manual. Perform periodic checks of the product's performance. The manufacturer or its representatives assume no responsibility for results of the use of this product including any direct, indirect, consequential damage, and loss of profits. Check your work frequently.

WARNING: When working near construction or agricultural machinery, follow all safety precautions as described in the machinery's user manual.

WARNING: When excavating, follow all excavation and trench safety regulations and practices

CAUTION: Be aware of all overhead obstructions and electrical power lines. The receiver and mast may be higher than the machinery. Remove when transporting machinery.

CAUTION: Do not disassemble any part of the receiver other than to replace batteries. The receiver is to be serviced by authorized service center personnel only.

System Description

The laser receiver is a rugged, multipurpose, electronic receiver that detects laser light generated by rotating laser transmitters. The unit works with nearly all models of rotating lasers and will detect both visible and invisible beams.

When installed, the operator is given visual indication of the reference plane of laser light's position relative to the cutting edge or digging depth of the machine. The receiver can also be installed with a Control Box for automatic control on certain grading machines.

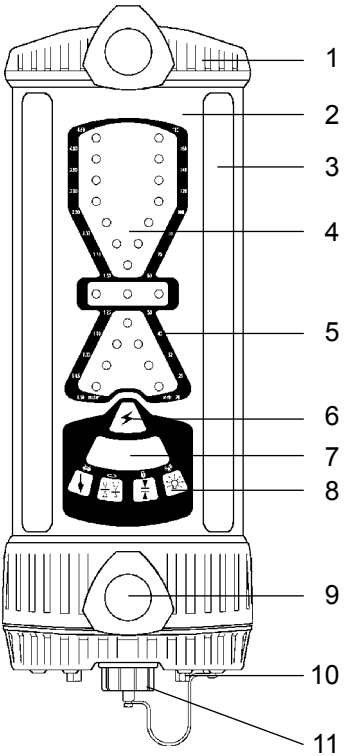
The operator can adjust the settings of the receiver to meet job site requirements. Settings are provided for adjusting the dead-band size or accuracy, on-grade location for grading or excavation, display brightness and more.

The ultra-bright, built-in LED display provides up to 8 channels of grade elevation position, plus high and low lost beam indications.

Built in plumb indication allows for quick and accurate grade checks. The new Angle Compensation for Excavators (ACE) mode also allows grade checking at extended dipper arm swing angles once a simple set-up procedure is completed.

A tough sealed waterproof housing is designed to work in the tough machine mounted environment. The electronics are isolated from the rest of the unit by internal rubber shock-mounts, protecting the unit from shock and vibration damage.

Controls and Displays



1. Aluminum cast upper and lower housings.

2. Polycarbonate housing - protects the electronics.

3. Receiving Windows - four sets of photocells equally spaced to allow 360 degree reception.

4. Ultra-bright LED array - highly visible, graphically displays blade or bucket position. Green on-grade LED's and red off-grade LED's for quick visual indication.

5. Set-up length scale - used for initial set-up in wide Angle Compensation for Excavation (ACE) mode.

6. Power Switch - turns the unit on and off. Also operates as a "shift" key for secondary receiver functions.

7. Liquid Crystal Display - Indicates current receiver settings and battery status.

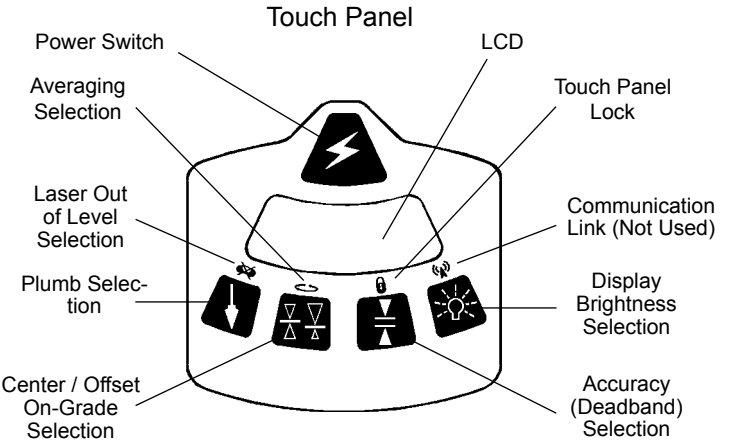
8. Touchpanel Switches - allow adjustment of settings.

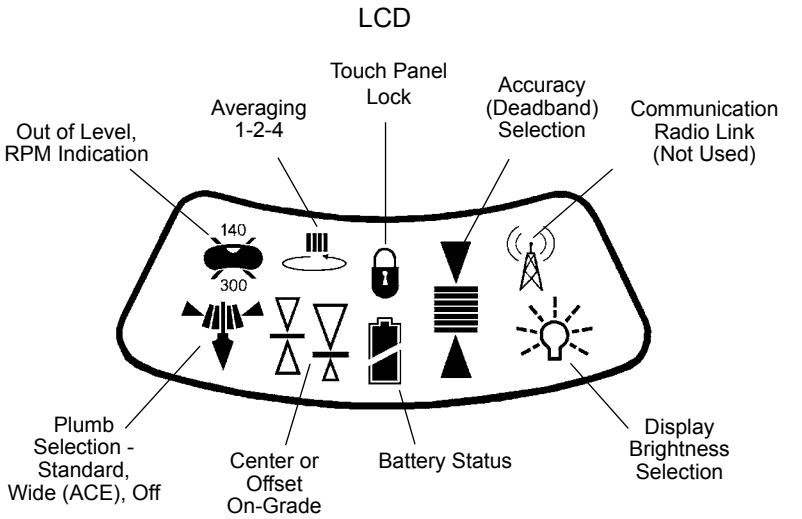
9. Mounting Knobs - large knobs attached to stainless steel clamps allow for quick and easy installation to mast or magnetic mount.

10. Access screws - allow easy access to battery compartment for replacement of batteries.

11. Accessory Connector and Dust Cap - connector accepts the cable to the optional remote display, machine power cable, or automatic control box. Connector also accepts Ni-MH battery charger. Dust cap helps keep the connector clean.

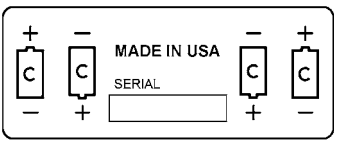
Controls and Displays





Battery Installation / Charging

Battery Installation: Remove the BULLSEYE from its carrying case. Hold the unit so the accessory connector is pointing upwards. Remove the dust cap from the accessory connector. Loosen the two thumb screws and remove the battery access cover. Install four batteries as shown on the label diagram inside the battery compartment noting the (+) and (-) terminals.



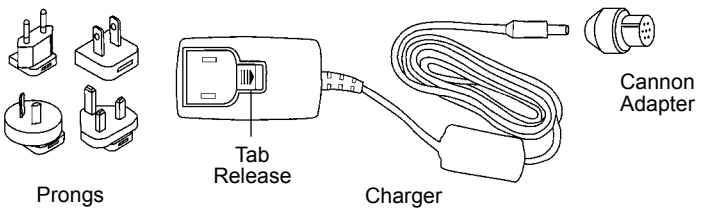
Battery installation diagram / Serial number label

Replace the battery access cover. Firmly tighten the two thumbscrews. Ensure the battery access cover is aligned and fully engaged into the battery housing. Use a screwdriver if necessary. Replace the accessory connector dust cap.

Nickel Metal Hydride (Ni-MH) Batteries: Batteries are initially shipped fully charged but the charge may decrease over time prior to first use. They may require 2 or 3 charging cycles to obtain maximum battery life. To charge, remove the dust cap from the accessory connector. Insert the cannon adapter into the receiver accessory connector aligning the slot and connector key. Insert the charger female barrel connector into the cannon adapter.

Assure the proper AC prongs are on the charger. To change the prong configuration, press the tab release in the arrow direction and remove the existing prong adapter. Insert proper adapter and release the tab.

Plug the charger into an appropriate outlet. Do not operate the receiver when it is charging.



The batteries may also be charged with a 12-volt auto lighter adapter.

Battery Installation / Charging

Built-in overcharging protection prevents damage if the unit is left on charge after being fully charged. There is also protection to prevent charging alkaline batteries.

CAUTION: Do not attempt to charge alkaline or other disposable batteries.

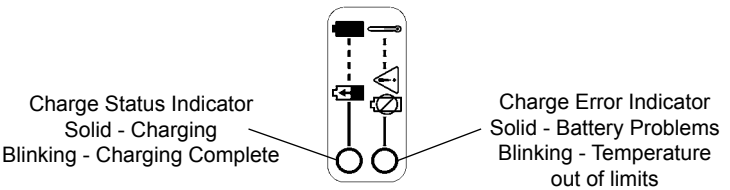
NOTE: Do not charge Ni-MH batteries when ambient temperature exceeds 113° F (45° C) or is less than 32° F (0° C).

The rechargeable battery electronics include a charge status and charge error indicator located on the back of the housing.

Charge Status Indicator: The LED will remain solid when the unit is charging. The LED will blink when fully charged. When charged, unplug the charger from the outlet and remove the cannon adapter from the accessory connector.

Charge Error Indicator: If the batteries seem to be in a totally drained state initially, the charge circuit will try to gradually charge the batteries. If charging is unsuccessful after approximately 20 minutes, the LED will turn on solid indicating an error with the internal battery connection, improper battery insertion, the wrong type of battery, or a dead battery cell.

A blinking charge error LED indicates the unit is too hot or too cold to charge. Charging will automatically start when the temperature is within the above noted ranges.



(Located on lower rear of polycarbonate housing)

Battery Replacement - Remove dust cap, loosen thumbscrews, and remove battery access cover. Remove old batteries. Install new batteries as described on previous page.

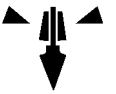
Refer to your local requirements for the proper disposal of batteries.

Operation

Primary touch panel switch operation, battery status and out of beam indication follow. Secondary switch operation begins on page 19.

Power Switch: Press the power switch on the touch panel to turn the unit on. All the LED's will light and then each row will light from top to bottom. The LCD will cycle its symbols. If the receiver is out of the laser beam, the center green LED will flash and the LCD will be on to confirm power is on. If the receiver is in a laser beam, a corresponding LED grade display will be indicated.

Plumb Switch: Three position switch - off, standard, and Angle Compensation for Excavation (ACE) mode. Plumb indication is generally used during excavation operations. Press the switch once to change between standard plumb mode and plumb off. The standard plumb is preset to a range of ± 2.5°. The LCD will show no plumb symbol when it is turned off and will show the standard plumb indicator when the standard plumb mode is selected. The grade indication LED's will flash quickly when the mast and receiver are extended beyond the plumb range and will flash slowly when retracted beyond the range. The display will be solid when the mast and receiver are within the plumb range.



Standard Plumb Indicator

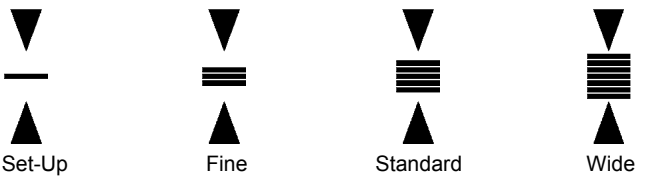
Angle Compensation for Excavation (ACE) mode: The receiver displays grade information at wide swing angles of ± 10° to 30°. To enter this mode, press and hold the Plumb Switch for approximately 2 seconds. The on-grade location will automatically switch to the center on-grade and the wider plumb angle symbol will appear on the LCD. A single or pair of LED's will be lit. These LED's correspond to the set-up length that is input using the scale on the front label of the display area. A set-up procedure is required to compensate for the dipper arm swing arc. To determine this length and for more installation information, please refer to the instructions beginning on page 11.

Angle Compensation Indicator

Operation

Center / Offset On-Grade: Center on-grade or "grading mode" is selected when grade information is useful both above and below on-grade, as with typical grading operations. Offset on-grade or "excavator mode" is selected when using a backhoe or excavator. The excavator mode gives more information and a larger display above on-grade. Press the switch to cycle between the two options. The LCD will indicate which mode is selected and the LED's will display the appropriate pattern. The center on-grade has 7 display channels plus 2 out of beam indications. The offset on-grade has 8 display channels plus 2 out of beam indications.

Deadband (Accuracy): Four deadbands are available in the grading and excavating modes. The LCD indicates which mode is selected. 2 deadbands - fine and standard - are available in the angle compensation (ACE) mode. The smallest deadband is used for receiver set-up. Selections are then made to fit job requirements. Please refer to the specifications on page 22 for specific deadbands. To change the deadband, press the deadband selection switch. The deadband and corresponding LCD symbol will change and cycle with each press.



Operation

Display Brightness: The brightness switch controls the LED brightness. Bright, Dim, and Off are the options. Use Dim for normal and lower light conditions and Bright for sunny daytime operation if necessary. Display Dim will conserve battery life by approximately 50%. Press the Display Brightness switch to cycle through the three options. The selection will be indicated on the LCD.

Display Bright

Display Dim

Additional Features

Battery Status Indication: Battery status symbol is depicted on the LCD when the unit is powered by batteries. Three levels are displayed. The battery symbol is full when the batteries are good. The battery symbol is half full and blinking when the batteries are low. The receiver will still operate for a short period of time. When there is an outline only, the batteries are drained and must be replaced. The battery symbol outline and the four corner LED's will flash to indicate the batteries require replacement or charging.

Battery Status- Good

Battery Status- Low

Battery Status- Replace

Out of Beam Indication. The LED display will indicate if the receiver has moved beyond the vertical laser reception range. A sequence of LED's will indicate which direction the implement must be moved to pick up the beam. The out of beam indication will continue for approximately two minutes.

Out of Beam Indication Disable: The out of beam indication can be turned off if desired. Press the two outer switches (Plumb Selection and Brightness) at the same time to disable. The receiver will display the out of beam LED sequence in reverse order from both top and bottom. When disabled, the receiver will indicate out of beam by flashing the center LED. Press the two outer switches again to enable the indication. The receiver will remember the out of beam display state at the next power up.

Installation - General

Set up the laser in a convenient, safe location. Please refer to the laser operator's manual. Ensure the laser is on a stable tripod. On windy days it may be advisable to tie down the tripod for a more stable laser beam.

Operating distances are dependent upon the rotating laser power. The receiver can pick up the beam from all directions (360°), but requires a clear line of sight between the laser and receiver.

If your laser has selectable rotation speeds, select a high rotation speed. The receiver can process speeds up to 1200 RPM.

To mount the receiver on the mast, turn both the top and bottom knobs counterclockwise until the mounting clamps in back open enough to fit around the mounting mast. Place the receiver on the mast. The receiver will mount to round tubing that has a 1.66" to 2.00" outside diameter (42 to 50 mm) or to 1 1/2" (38 mm) square tubing. Turn the knobs clockwise to tighten. Loosen the two clamps to remove the receiver from the mast.

For excavation, the receiver may be set up in the trench or above ground. Please follow all safety precautions per the machines operator's manual and follow all excavation and trench safety requirements and practices.

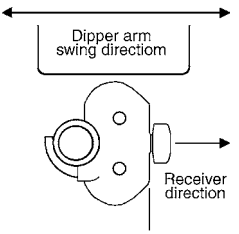
Angle Compensation (ACE) mode ***- the horizontal grade checking width will be wider as the receiver set-up length is decreased.*** For example, the closer the receiver is mounted to the bucket, the wider the grade checking range will be.

The most accurate and repeatable method for checking grade is with the bucket cylinder fully retracted. ***The mast must be mounted so it points to the bucket teeth in this set-up.***

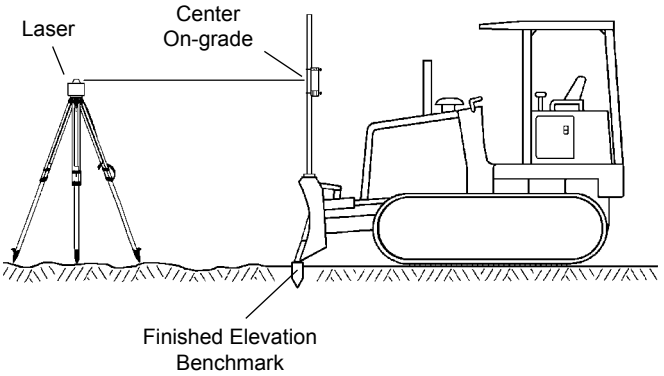
Checking grade with the bucket levelled or other positions provide for faster rough excavation. The receiver indicates level at the bucket pivot pin in these positions. It is important to take grade readings only when the bucket is in the original set-up position.

The LED display must be in the direction of the operator and be perpendicular to the direction of the dipper arm swing.

For all excavation operations, always take a sample reading with the bucket "on-grade" and check to ensure the elevation is correct.



Installation - Grading



Position the machine so the blade can be set to the desired finished elevation. Typically on a benchmark or hub stake.

Set the laser up in an appropriate location for receiver visibility and efficient machine operation and turn it on.

Turn the receiver on, select center on-grade (grading mode) and select the smallest deadband.

Mount the receiver to the mast.

Slide the receiver up or down until on-grade is indicated. It may be necessary to adjust the height of the laser.

Alternatively, if the height of instrument (laser beam) to finished elevation length is known, the receiver can be set by measuring this distance from the cutting edge of the blade to the center on-grade mark on the back of the receiver label.

Face the LED grade display toward the operator and tighten the clamps.

Select the desired deadband and brightness.

The LED grade display will direct the operator which way to move the blade using the machine's controls to maintain an on-grade reading.

Make a sample pass with the blade "on-grade" and check to ensure the elevation is correct.

Installation - Excavating

Angle Compensation for Excavation (ACE): Use the length determined by the set-up procedure described on pages 14 to 17.

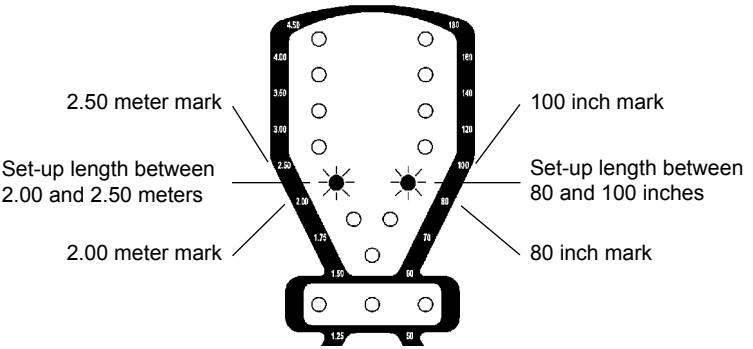
Press and hold the plumb switch to enter the ACE mode and the set-up length entry mode.

The on-grade location will automatically switch to the center on-grade and the wide plumb (ACE) symbol will appear on the LCD.

Single or pairs of LED's are lit and cycled up the scale as the switch is held.

Release the switch when the LED's are closest to the set-up length. An LED blink will confirm the settings in approximately 2 seconds.

Example: If the set-up length measurement was 84 inches, the switch would be released when the pair of LED's are lit between the 80 and 100 inch marks on the right side scale. (If the set-up measurement was 2.13 meters, the switch would be released between the 2.00 and 2.50 meter marks on the left side scale.)
The LED's will blink briefly to confirm the setting selected.



If the set-up number is passed, simply continue to press the switch until it is cycled to the correct number again. The number may also be selected by pressing and releasing the switch while in the set-up length entry mode. The LED's will change one increment each time the switch is pressed. Release the switch for to accept the displayed set-up length. An LED blink will confirm the settings in approximately 2 seconds.

If the set-up length measurement is exactly a number on the scale, simply set to the next higher number on the scale.

Installation - Excavating

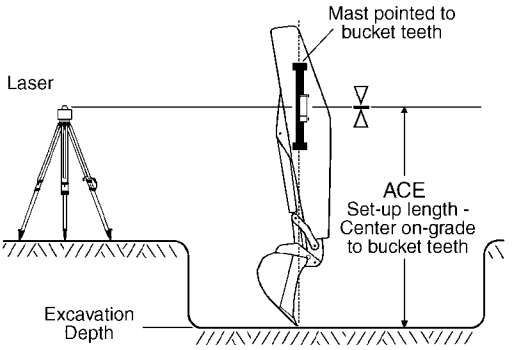
In Trench Set-Up - Bucket Extended

Position the machine and dig to the desired finished elevation.

Fully retract the bucket cylinder and place the bucket teeth at the finished elevation.

Set the laser up and turn it on.

Standard Plumb: Mount the mast on the side of the dipper arm.



Turn the receiver on and select standard plumb mode, offset on-grade, (center on-grade may be used) and the smallest deadband.

Place the receiver on the mast, tighten, and adjust the dipper arm so the receiver is within the standard plumb range.

Slide the receiver up or down to get an on-grade display then tighten.

Select the desired deadband and begin to excavate.

Take grade readings with the bucket retracted and the LED's solid.

ACE mode: Mount the mast on the side of the dipper arm so it **points to the bucket teeth** as illustrated above.

Turn the receiver on and select standard plumb mode, **center on grade**, and the narrowest deadband.

Mount the receiver to the mast, adjust the dipper arm to plumb, and slide the receiver up or down to get a solid on-grade display.

Safely measure the distance from the **bucket teeth** to the center on-grade mark on the back of the receiver. This is the set-up length.

Enter the ACE mode. Press and hold the plumb switch to scroll up the set-up length scale and release the switch when the lit LED is closest to the measured set-up length. The LED will blink to confirm the setting.

Select the desired deadband and begin to excavate.

Take grade readings with the bucket fully retracted and LED's solid.

Installation - Excavating

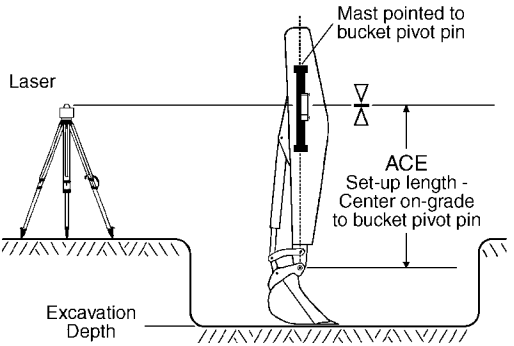
In Trench Set-Up - Bucket Levelled

Position the machine and dig to the desired finished elevation.

Level the bucket and place the bottom of the bucket at the finished elevation.

Set the laser up and turn it on.

Standard Plumb: Mount the mast on the side of the dipper arm.



Turn the receiver on and select standard plumb mode, offset on-grade, (center on-grade may be selected) and the smallest deadband.

Place the receiver on the mast, tighten, and adjust the dipper arm so the receiver is within the standard plumb range.

Slide the receiver up or down to get an on-grade display then tighten.

Select the desired deadband and begin to excavate.

Take grade readings with the bucket levelled and the LED's solid.

ACE mode: Mount the mast on the side of the dipper arm so it **points to the bucket pivot pin** as illustrated above.

Turn the receiver on and select standard plumb mode, **center on grade**, and the narrowest deadband.

Mount the receiver to the mast, adjust the dipper arm to plumb, and slide the receiver up or down to get a solid on-grade display.

Safely measure the distance from the **bucket pivot pin** to the center on-grade mark on the back of the receiver. This is the set-up length.

Enter the ACE mode. Press and hold the plumb switch to scroll up the set-up length scale and release the switch when the lit LED is closest to the measured set-up length. The LED will blink to confirm the setting.

Select the desired deadband and begin to excavate.

Take grade readings with the bucket levelled and LED's solid.

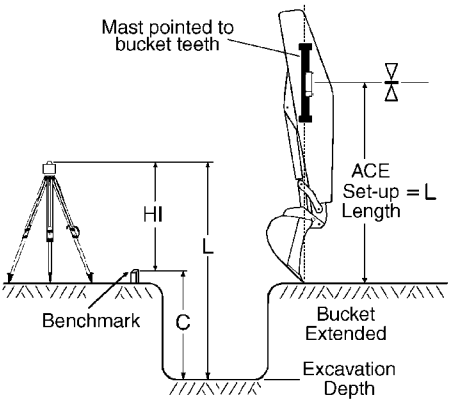
Installation - Excavating

Out of Trench Set-Up - Bucket Extended

Fully retract the bucket cylinder and position the machine so a measurement can safely be obtained on the dipper arm.

Set the laser up and turn it on.

Determine the distance from the laser to the bottom of the trench (L). This is the set-up length. The length is the height of the instrument (HI) plus the depth of cut from the benchmark to the bottom of the trench (C).



Standard Plumb: Mount the mast on the side of the dipper arm so it **points to the bucket teeth** as illustrated above.

Position the receiver so the set-up length L is the distance from the bucket teeth to the offset on-grade symbol on the back of the receiver. (Set up to the center on-grade symbol if center on-grade will be used).

Turn the receiver on and select standard plumb mode, offset on-grade, and the desired deadband. (Select center on-grade if set to center symbol).

Begin to excavate. Take grade readings with the bucket retracted and the LED's solid.

ACE mode: Follow the procedure above except the set-up length is the distance from the **bucket teeth** to the **center on-grade** symbol on the back of the receiver.

Enter the ACE mode. Press and hold the plumb switch to scroll up the set-up length scale and release the switch when the lit LED is closest to the measured set-up length. The LED will blink to confirm the setting.

Select the desired deadband and begin to excavate.

Take grade readings with the bucket retracted and LED's solid.

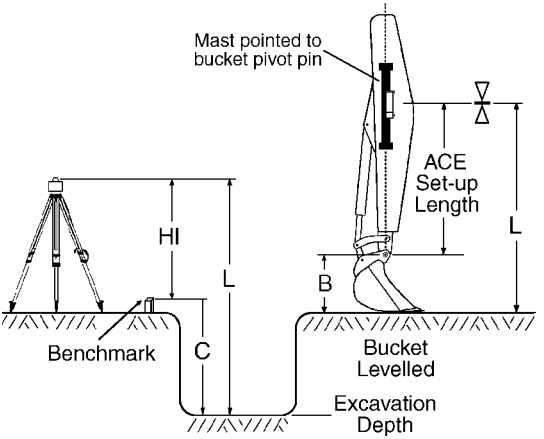
Installation - Excavating

Out of Trench Set-Up - Bucket Levelled

Level the bucket and position the machine so a measurement can safely be obtained on the dipper arm.

Set the laser up and turn it on.

Determine the distance from the laser to the bottom of the trench (L). The length is the height of the instrument (HI) plus the depth of cut from the benchmark to the bottom of the trench (C).



Standard Plumb: Mount the mast on the side of the dipper arm so it points to the **bucket pivot pin** as illustrated above.

Position the receiver so the set-up length L is the distance from the bucket bottom to the offset on-grade symbol on the back of the receiver. (Set up to the center on-grade symbol if center on-grade will be used).

Turn the receiver on and select standard plumb mode, offset on-grade, and the desired deadband. (Select center on-grade if set to center symbol).

Begin to excavate. Take grade readings with the bucket levelled and the LED's solid.

ACE mode: Follow the procedure above except the set-up length is the finished elevation to the **center on-grade symbol (L) minus the bucket height length (B)**. (Set-up length = L - B)

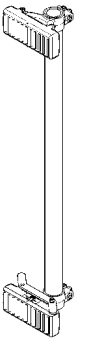
Enter the ACE mode. Press and hold the plumb switch to scroll up the set-up length scale and release the switch when the lit LED is closest to the measured set-up length. The LED will blink to confirm the setting.

Select the desired deadband and begin to excavate.

Take grade readings with the bucket levelled and LED's solid.

Installation - Excavating

NOTE: For all excavation operations, always take a sample reading with the bucket "on-grade" and check to ensure the elevation is correct. For all grading operations, make a sample pass with the blade "on-grade" and check to ensure the elevation is correct.



Magnetic Mount Installation - For excavators and backhoes, determine where the mount will be located on the machine so that when the receiver is attached, it will intersect the laser beam. Refer to the previous installation instructions if the Angle Compensation for Excavation (ACE) is to be used. Ensure the area of the machine is clean and free of oil and grease. Angle the mount so the top edge of the top magnet will be positioned first. Holding the mount by the pipe with both hands, place the top edge of the magnet on the machine. Slowly move the bottom magnet towards the machine so the mount remains plumb or in the necessary set-up position.

CAUTION: Strong magnetic field; Do not position fingers next to magnets.

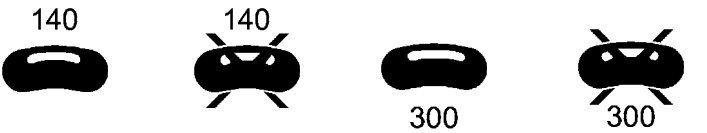
To remove the magnetic mount, first remove the receiver from the mounting pole. Use a scrap piece of wood or other long object as a pry bar if necessary. Insert the pry bar in between the magnetic mount pole and the machine. Pry the mount sideways to loosen the magnetic hold. Once the magnetic hold is loosened, the mount can be easily taken off the machine by hand.

NOTE: For extendable dipper arms - if the mast is mounted to the dipper arm section that moves with the bucket, grade can be checked with the dipper arm extended to any position. If the mast is mounted to the dipper arm section that does not move with the bucket, grade can only be checked when the dipper arm is in the exact set-up position.

Operation - Secondary Functions

While the unit is on, pressing and holding the power switch and then pressing the touch panel switches will activate secondary or "shift" functions which are indicated by the symbols above the switch.

Laser Out-of-Level: This function is for use with lasers that have the ability to indicate that they are out-of-level by changing the RPM of the laser. Two speeds of 140 RPM and 300 RPM are available as well as out-of-level turned off. Press and hold the power switch and then press the plumb switch to cycle through the options of 140 RPM, 300 RPM, and off. The LCD will indicate which is selected. "No display" on the LCD indicates out-of-level is disabled. When the laser RPM drops to the selected laser out-of-level speed, an "X" symbol will appear on the LED grade display and on the LCD symbol.



140 RPM Selected

Laser below 140 RPM Indicator

300 RPM Selected

Laser below 300 RPM Indicator

Beam Averaging: Press and hold the power switch and then press the on-grade location switch to select and cycle the laser beam averaging function. Selection "Off" - no display - chooses adaptive averaging. In this mode the receiver applies the highest level of averaging appropriate for the laser rotation speed. A selection of one means every beam strike is processed. Selecting two or four creates a rolling average of every two or four beam strikes. This stabilizes the LED display in unstable laser set-ups such as windy conditions or over long distances.

No Averaging Selected

Averaging 2 Selected

Averaging 4 Selected

Operation - Secondary Functions

Touch Panel Lock: Press and hold the power switch and then press the accuracy switch to turn the touch panel lock function on and off. When on, the lock symbol is displayed on the LCD. Switches cannot be changed and accidental changes from dirt or debris knocking the switches are prevented. To make changes to the unit, turn the switch panel lock off.

Touch Panel
Lock On

Communication Options: This function is not currently used on the receiver.

Maintenance and Care

The user of this product is expected to follow all operating and safety instructions of this manual and of the machinery operator's manual. Perform periodic checks of the product's performance. The manufacturer or its representatives assume no responsibility for results of the use of this product including any direct, indirect, consequential damage, and loss of profits. Check your work frequently.

Your laser receiver was shipped in a protective carrying case. If the unit is transported from job to job inside its protective case and normal instrument precautions are followed, the unit will provide many years of service.

Do not wipe dust or dirt off the laser receiver with a dry cloth as scratching could occur, possibly damaging these surfaces. Use only a good quality glass cleaner with a soft cloth on all external components. If these surfaces have hardened concrete or other materials on them, take the system to your Authorized Service Center for cleaning.

If the system will not be used for a 30 day period or more, it is recommended to remove the batteries from the receiver. Store and transport the receiver in its carrying case.

Refer to your state or local requirements for the disposal of batteries. Be sure to dispose of all batteries properly.

Specifications

Beam Reception Range	360 degrees	
Operating Range	2000 ft (610 m) radius, laser dependent	
Laser RPM	Minimum - 105 ; Maximum - 1200	
Vertical Reception	8.75 in. (222 mm)	
Accuracy:		
On-Grade Deadbands	Grading	Excavating
Set-Up	0.20” (5 mm)	0.25” (6 mm)
Fine	0.40” (10 mm)	0.50” (12 mm)
Standard	0.80” (20 mm)	1.00” (25 mm)
Wide	1.60” (40 mm)	2.00” (50 mm)
	ACE - Angle Compensation Mode	
Fine	0.50” (12 mm)	
Standard	1.00” (25 mm)	
Plumb Swing Range		
Standard	± 2.5°	
Angle Compensation Mode	± 10° to ± 30°	
Display Output	Bright, Dim, or Off	
Power Options	Alkaline - 4 x "C" Cell - Standard Nickel Metal Hydride - 4 x "C" Cell Power Cable - 10 -30 VDC	
Battery Life - Alkaline	75 hours, Display Dim	
(Continuous in beam)	50 Hours, Display Bright	
Battery Life - NiMH	55 hours, Display Dim	
(Continuous in beam)	40 hours, Display Bright	
Battery Recharge Time	3 - 4 hours	
Automatic Shut Off	75 minutes with no laser beam	
Out of Beam Indication	High and Low	
Remote Display Option	Yes	
Automatic Control Option	Yes	
Dimensions	(LxWxD) 15.50" x 5.58" x 5.88" (394 x 142 x 149 mm)	
Mounting Pipe	1.66" to 2.00" Outside Diameter tube (42 mm to 50 mm) and 1 1/2" (38 mm) square tube	
Operating Temperature	-4° F to 140° F (-20° C to +60° C)	

Warranty

This product is warranted to be free of defects in material and workmanship for a period of two years. This warranty period is twenty-four months from the date the product is delivered from the dealer to the purchaser or is put into service by a dealer as a demonstration unit or rental unit.

Please retain your product information and proof of purchase. Proof of purchase must accompany your request for warranty repair.

Any evidence of abuse, misuse, alteration, accident or negligent use or an attempt to repair products by unauthorized personnel or with parts other than those provided by the manufacturer automatically voids the warranty.

The user of the product is expected to follow all operating instructions, periodically checking the instrument and the work as it progresses.

The manufacturers liability under this warranty is limited to repairing or replacing any product returned to an authorized service center for that purpose. The foregoing states the entire liability of manufacturer regarding the purchase and use of its product and they shall not be held responsible for any consequential loss or damage of any kind.

This warranty is in lieu of all other warranties, expressed or implied, and constitutes all of manufacturer's liability with respect to merchandise sold by it.

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